

攀爬時手臂的姿勢對手部負荷的影響

Effects of hand loading on different arm postures during simulating rock-climbing

洪維憲(Wei-Hsien Hong)^{1*} 何金山(Chin-Shan Ho)² 陳登相(Deng Hsiang Chen)²

¹ 中國醫藥大學 運動醫學系 (Department of Sports Medicine, China Medical University)

² 國立體育大學 運動科學研究所 (Graduate Institute of Sports Science, National Taiwan Sport University)

*Email: whhong@mail.cmu.edu.tw

一、中文摘要

攀岩運動造成上肢因運動而罹患肌肉骨骼傷害的情形普遍地存在於運動員中，如何能即早診斷出累積性傷害並加以預防，是目前運動傷害研究中重要的課題。因此，本研究目的針對攀爬時不同手臂姿勢時手部負荷及疲勞分析。研究延攬6名攀岩者平均年齡 23.2 ± 3.8 歲，四個負荷元量測手指及腳負荷，無線表面肌電圖系統量測肱二頭肌、肱三頭肌、腕屈肌及腕伸肌EMG的收集。在二種不同手肘角度(垂直及0度)姿勢下量測四肢的負荷(kg)及上肢的EMG值(%MVC)。結果顯示，右左手在攀岩負荷不平均，慣用手大於非慣用手($P<0.05$)，而手肘垂直時手部負荷大於手肘0度時。而由EMG發現手肘垂直時在屈腕肌、肱二頭及肱三頭肌明顯大於手肘0度時的肌電負荷($P<0.05$)。說明攀岩中屈腕肌與伸腕肌是同步用力，因此在訓練過程中應並重屈腕及伸腕肌力量的訓練。

關鍵詞： 攀岩、肌肉疲勞、肌電圖

Abstract

Musculoskeletal disorders of the upper extremity due to sports activities occur in rock climbing. It is an important issue to diagnose the risk factors of cumulative trauma disorder (CTD) and early preventive prior to sports injuries. Therefore, the purpose of this study was to analyze the effect of hand loading and muscular fatigue in different elbow angles for rock climbing. Six rock climbers were recruited for this study, average age was 23.2 ± 3.8 years. Four load cells and an EMG system were integrated to collect force and EMG data simultaneously. The EMG measure included wrist flexor, wrist extensor, brachium biceps and triceps muscles. Forces and EMG data were collected in elbow 90° and 0° . Results showed dominant hand has larger loading than non-domain hand. There were larger loading of force and EMG at elbow 90° as compared to elbow 0° . The support duration and the time when MF appear distinct fall is lower in open-hand than in crimp condition. The development of isometric muscle endurance is important to long-term support in rock climbing. Wrist flexor and extensor always energize at the same time, so it will attach equal importance to the strength training of both muscles.

Keywords: rock climbing, muscle fatigue, electromyography